Environment Canada
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Inland Waters Directorate

Direction générale des eaux intérieures

Ontario Region

Region de l'Ontario

Canada

WATER QUALITY BRANCH
INLAND WATER DIRECTORATE
ONTARIO REGION

MATERIAL OUTPUT FROM LAKE ONTARIO TO THE ST. LAWRENCE RIVER FOR 1984

Aline Sylvestre

SEPTEMBER 1985

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1. Introduction

As part of Environment Canada's committment to the Great Lakes Water Quality Agreement of 1978 between Canada and USA, the Water Quality Branch, Ontario Region presents to the Water Quality Board of the International Joint Commision (IJC), annual estimates of the loading of material from Lake Ontario to the St. Lawrence River.

The object of this report is to provide such information for 1984.

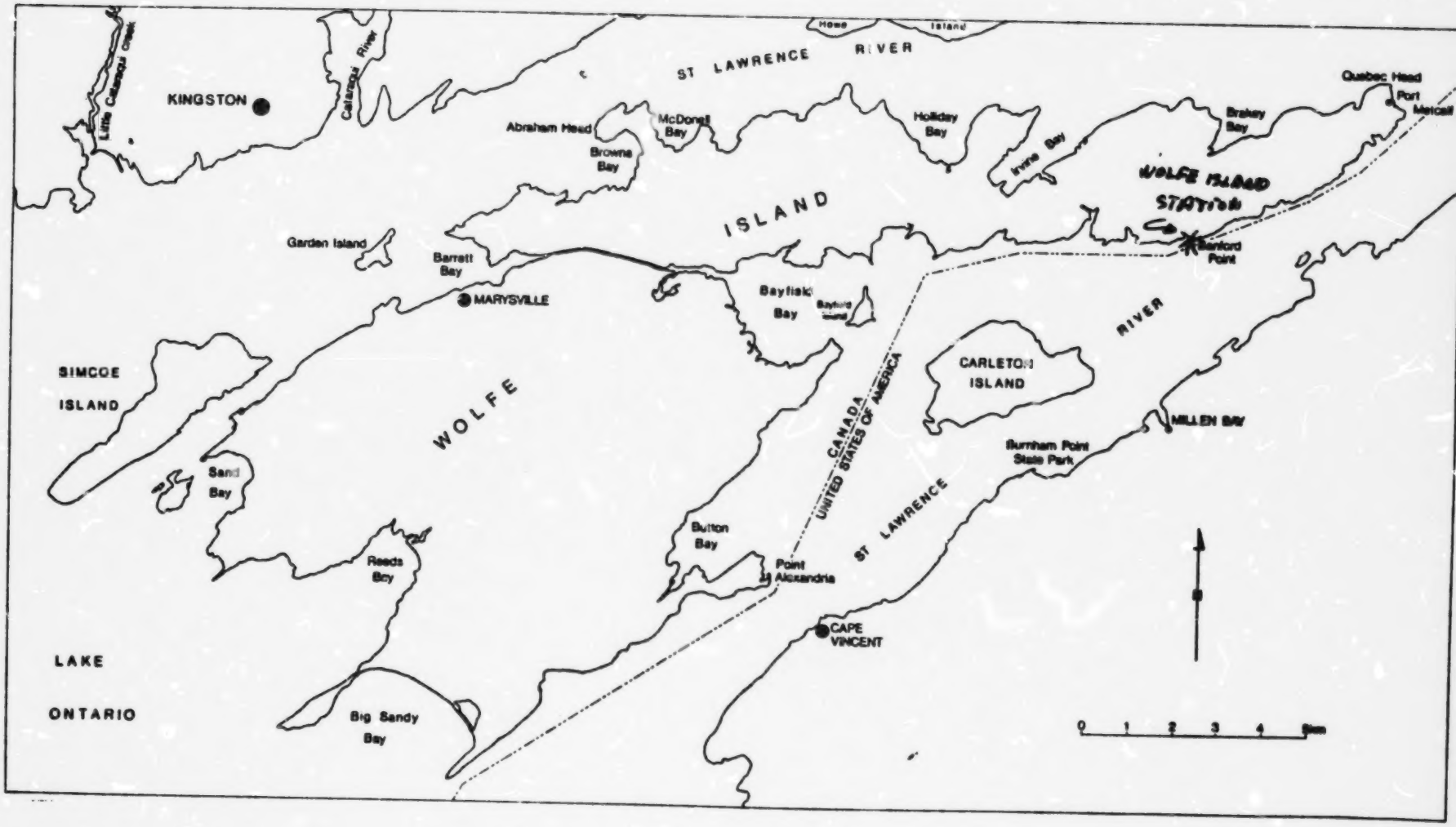
2. Sampling and Analysis

The sampling site is located on Wolfe Island at Bonford Point in the South Channel of the St. Lawrence River (lat. 44° 12'24", long. 76° 14'08", figure 1.1) .

The sampling system consists of an intake pipe, a pump and an automatic sampler. Prior to June 1984, a Moyno Model FA11 pump was used but since then a submersible March 5C-MD pump hasbeen used.

The intake is situated about 122 meters (400 feet) from the shore and approximately 6 meters (20 feet) from the bottom of the river. The depth of the river here is around 14 meters (45 feet).

Figure 1.1: Location of Wolfe Island station.



Water samples are collected daily for nutrients analysis and weekly for major ions and trace metals. They are processed on site and sent to Burlington through the contract service of a lay collector, on whose property the site is located.

Methods of preservation and analysis used are described in the "Analytical Methods Manual, Update 1981 " (Environment Canada, 1981).

3. Site Representativeness

Wolfe Island divides the St. Lawrence River into two channels; 44% of the flow passes north of the island and 56% to the south (BLERLAB NOAA, 1977).

A t-test done on data collected in 1973, 1974 and 1977 for both channels shows that the chemical concentrations are similar on both sides of the island (α=.05); for the following parameters: specific conductance, pH, total phosphorus, nitrate+nitrite, total Kjeldahl nitrogen, calcium, magnesium, sulphate, chloride, sodium, potassium, iron, manganese and zinc. These data were from samples collected on transects on both channels of the river at 1 meter depths. It was assumed that the water is well mixed from top to bottom, therefore the mean value for the transect was used to represent the whole river.

4. Validation of the data

A physico-chemical validation of the data was completed on each sample by the Water Quality Branch National Laboratory. The method used is the calculation of the ionic balance. Details of this test are reported in Demayo 1971.

After laboratory validation, statistical filtering was carried out on the data set. Seasonal means (Summer: June to September, Fall: October to December and Winter: January to April) were calculated for nutrients and major ions and yearly means for trace metals. Values more than three standard deviations above or below these means were excluded from the loading calculation (table 1.1). As there was more than 30% of the data below detection limit for cadmium, chromium, manganese, nickel and lead, the results for these parameters are not reported.

More details concerning the sampling site, sampling methodology, and the statistical analysis are avalable in Sylvestre et al, 1985.

Table 1.1: Statistical range for specific conductance, pH, nutrients, major ions and trace metals with number of outliers at Wolfe Island station in 1984.

PARAMETERS	WINTER		N	SUMMER		N	FALL		N	N TOTAL	NUMBER DATA
	<	>		<	>		<	>			
Total Phosphorus	0.0003	0.0189	2	0.0038	0.0200	0	0.0000	0.0237	2	4	348
Nitrate+Nitrite	0.181	0.448	2	0.000	0.361	0	0.048	0.372	0	2	346
T. Kjeldahl N.	0.121	0.397	0	0.084	0.420	1	0.152	0.254	1	2	348
Silica (reac.)	0.000	0.909	0	0.000	0.635	0	0.099	0.747	0	0	52
Calcium	34.0	40.2	1	29.9	42.6	0	33.4	40.4	0	1	51
Magnesium	7.0	8.2	1	7.2	8.4	0	7.7	8.3	0	1	51
Sulphate	25.8	29.4	0	25.7	29.3	0	24.0	29.4	0	0	52
Chloride	21.9	27.9	1	23.3	27.5	0	23.3	26.3	0	1	52
Sodium	10.9	13.3	0	11.3	14.3	0	11.2	13.0	0	0	52
Potassium	1.1	1.7	0	1.4	1.4	0	1.4	1.4	1	1	52
Total Alkalinity	83.7	106.5	0	76.1	106.1	0	82.5	98.7	0	0	51

All year

Parameters	<	>	N	Number of data	% of Flagged data
Iron	0.0000	0.1300	1	56	0
Cadmium	-	-	-	56	100
Chromium	-	-	-	56	38
Lead	-	-	-	56	60
Manganese	-	-	-	56	84
Nickel	-	-	-	56	32
Zinc	0.0000	0.0107	1	56	13
Aluminum (ext.)	0.0000	0.1100	1	56	2

N : Number of outliers.
< > : Seasonal means ± 3 times standard deviation.
Flagged data: Values below detection limit.

Winter: January, February, March, April, May
Summer: June, July, August, September
Fall : October, November, December

5. Loadings

5.1 Discharge

Flow data are provided by the Cornwall office of Water Planning and Management Branch, IWD/OR.

The travel time of the water from Kingston to Cornwall is estimated to be approximately 9 days. Therefore, the discharge measured at Cornwall is lagged by this period in order to correspond to Wolfe Island flow.

The contribution of tributaries in this section of the St. Lawrence River has been estimated at around 1% of the total flow at Cornwall (Casey and Salbach, 1974). This amount has not been subtracted from Cornwall's discharge.

5.2 Calculation

Daily concentration values are expressed as mg/L. Daily flow data are given in cubic feet per second. In order to have the loading in metric tonnes per day it is necessary to multiply the product of concentration and flow by a conversion factor corresponding to .00245 as in the following formula.

D. loading = D. conc. (mg/L) X D. discharge (cfs) X .00245

Yearly loadings were obtained by a multiplication of the daily loading by 365.25.

6. Results

6.1 Evaluation of the total phosphorus results

Because of the delay due to shipment of the samples, an attempt to verify the accuracy of the nutrients results was made from March 1984 to April 1985. The results of this study indicate that nitrate+nitrite and ammonia remained relatively stable but that the total phosphorus samples preserved on site (TPP) are 12% higher then the routine samples (TPR) that are preserved in the laboratory (Sylvestre, 1985).

A paired t-test done on loading estimates calculated from both measurements (table 1.2) indicated a significant (α=.05, n=97) difference between the mean loadings. For the study period (03-1984 to 04-1985),the samples preversed on site (8.9 MT/day) gave daily loadings 1 metric ton per day higher than the samples preserved upon arrival at Burlington (7.7 MT/day). This is an increase of 12.6%.

The total phosphorus results presented in Table B.1 for 1984 are the ones estimated from the routine samples. A daily mean loading of 8.7 MT/day would be closer to reality.

Table 1.2: Comparison of loadings estimated by using total phosphorus samples preserved on site (TPP) and routine samples (TPR) collected at the Wolfe Island station from March 1984 to April 1985.

DATE	LOADING MT/day TPR	LOADING MT/day TPP	DATE	LOADING MT/day TPR	LOADING MT/day TPP
30-03	7.5018	7.1699	06-10	5.8294	8.6447
03-04	10.4861	8.4888	09-10	6.7518	8.4067
07-04	8.1823	6.7504	13-10	5.9726	7.6134
10-04	7.0839	7.5899	17-10	7.9173	11.4865
14-04	9.4475	7.8259	20-10	5.3900	6.6868
17-04	9.7644	10.0516	23-10	6.0389	7.3376
21-04	8.2775	9.7426	27-10	4.9360	7.3390
24-04	10.3926	10.3926	30-10	4.9378	8.1864
26-04	9.5880	10.1124	03-11	6.5369	8.4785
28-04	5.9862	10.4793	06-11	7.8284	8.2812
01-05	18.4922	10.7060	10-11	6.6199	7.2689
05-05	8.2723	7.9715	15-11	11.6803	12.1449
08-05	5.5681	9.5560	17-11	7.9858	7.2067
19-05	8.9352	8.3294	20-11	6.6921	7.5367
22-05	6.8994	9.0223	24-11	8.7398	7.7759
24-05	10.4838	9.8700	01-12	5.2477	6.5916
26-05	6.0834	9.6575	04-12	5.8083	8.7125
02-06	6.1500	9.6425	08-12	5.9453	7.8631
09-06	9.5629	8.7281	12-12	10.8699	18.3107
12-06	10.1950	10.8798	15-12	6.0132	6.8537
23-06	7.2522	11.1049	18-12	6.0175	7.4410
26-06	8.8323	13.0597	22-12	5.9954	6.5244
30-06	10.7628	11.4401	25-12	9.8131	7.6389
07-07	8.9132	12.0328	29-12	5.1193	6.3049
11-07	9.5755	10.0991		1985	
14-07	10.0111	7.3364	01-01	6.9547	6.4695
17-07	12.4771	12.6293	08-01	6.4742	6.5281
21-07	8.3756	9.9920	10-01	6.3103	7.0654
24-07	10.1484	14.7814	12-01	5.9180	5.5235
28-07	7.9484	9.3731	15-01	6.5282	7.9397
31-07	11.1057	13.2818	19-01	6.1861	8.0479
03-08	13.5656	2.2361	22-01	6.3665	7.6879
11-08	10.6739	10.7491	26-01	5.3894	7.2266
14-08	10.6833	10.3824	29-01	6.7418	8.3966
18-08	10.2014	12.1374	02-02	4.9988	7.0608
21-08	4.9967	10.8884	06-02	9.0468	7.8363
25-08	8.4656	8.6141	16-02	6.4692	7.5043
28-08	7.1367	10.1103	19-02	10.9342	6.7935
01-09	6.2811	9.2338	23-02	6.3517	7.0872
04-09	11.2095	11.5026	26-02	5.5246	7.4517
08-09	6.6212	8.8442	02-03	5.2110	9.0507
11-09	8.5979	10.3027	09-03	8.2349	11.3230
13-09	9.8934	9.9661	12-03	8.1646	7.2726
15-09	7.5691	9.2430	14-03	8.2291	9.0520
18-09	5.8995	8.1574	16-03	5.4283	7.2148
22-09	7.2075	9.0094	19-03	6.9897	7.8805
25-09	8.1832	8.5271	23-03	6.7575	7.0391
29-09	7.8777	8.2087	30-03	7.2461	7.0287
02-10	7.2208	9.9368	02-04	9.5014	9.2838

6.2 Loading results

Estimates of material output from Lake Ontario to the St. Lawrence River for each parameter are given in the Appendices. Daily discharge data are presented in Table A.1. Mean daily loadings are displayed in Table A.2. Daily nutrient loadings are given in Tables B.1 to B.4. Tables C.1 to C.7 list major ions loadings and Tables D.1 to D.3 show trace metal loadings.

For all nutrients and major ions reported except total phosphorus the 1984 loadings are higher then 1983 (table 1.3). This is due to an increase in the flow in 1984. In fact the concentrations of all major ions decreased except total alkalinity and sodium which increasesd and potassium wich remained stable. For nutrients however the situation is different. Loadings of nitrate+nitrite, total Kjeldahl nitrogen and reactive silica increased because of higher concentrations as well as higher flow in 1984. Only total phosphorus showed a decrease in loading in spite of the flow increase because of lower concentration. Annual loadings of 3.5 and 3.2 x 10^3 MT/day for total phosphorus for 1983 and 1984 (table 1.3) respectively would be a better estimation because of the effects of sampling procedures.

Trace metals loading are lower in 1984 then in 1983.

Table 1.3: Annual loading to the St. Lawrence River in 1983 and 1984.

PARAMETERS	1983		1984	
	CONC. mg/L	LOADING MT/Y (X 10^3)	CONC. mg/L	LOADING MT/Y (X 10^3)
T. Phosphorus	0.0126	3.1 (3.5)	0.0111	2.8 (3.2)
Nitrate+nitrite	0.228	54.7	0.236	55.7
T. Kjeldahl N.	0.231	55.7	0.241	61.3
Silica reac.	0.29	69.6	0.394	90.3
Calcium	37.3	9007.2	36.8	9228.6
Magnesium	7.9	1915.6	7.8	1948.8
Sulphate	28.1	6771.7	27.3	6881.8
Chloride	25.6	6175.9	25.1	6333.3
Sodium	12.2	2943.6	12.4	3110.8
Potassium	1.4	345	1.4	356.5
T. Alkalinity	91.9	22123.8	92.6	23267.3
Iron T.	0.10	24.4	0.04	9.4
Zinc T.	0.0045	1.1	0.0023	0.6
Aluminum ext.	0.04	9.2	0.01	3.7

Discharge (CFS) 1983: 269752
1984: 282085

CONC.: Mean concentration.
MT/Y: Metric tons/year.
( ): Corrected values (12.6% higher).

7. Acknowledgments

The author wishes to thank the Water Quality National Laboratory staff for the analysis of the samples and K. Kuntz for the revision of this paper.

REFERENCES

Environment Canada, 1981. Analytical Methods Manual Update 1981, Environment Canada, IWD, Ottawa 197 .

IJC, 1978. Great Lakes Water Quality Agreement of 1978, International Joint Commission, Ottawa, 150 p..

GLERLAB (Great Lakes Environment Research Laboratory), 1977. NOAA (National Oceanic and Atmospheric Administration), mathematical model for St. Lawrence River, Ann Arbor Michigan.

Casey, O.J., S.E. Salbach, 1974. Stream Materials Balance Study (IFYGL), Proc. 17th Conf. Great Lakes Res. 1974, 668-681. Internat. Assoc. Great Lakes Res.

Demayo, A., 1971. Computer Programs in use in the Water Quality Division, Vol. 2, Inland Waters Branch Department of Energy, Mines and Resources, Report series, No. 14, 1-11. (In AQUALAB-Program IONBAL).

Sylvestre A., K.W Kuntz and N.D.W Warry 1985. A Seven Year Study of Water Quality Data Collected at the Inlet to the St. LawrenceRiver (1977 to 1983), Inland Waters Directorate Water Quality Branch/Ontario Region, unpublished report, 57p.

Sylvestre A., 1985. Evaluation of the accuracy of the nutrients forms measured at Wolfe Island. Inland Water Directorate, Water Quality Branch/Ontario Region, unpublished report.

APPENDIX A

DAILY FLOW AND MEAN LOADING

STATION NUMBER - 00ON02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S) (122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 97163S. DISCHARGE
DAILY
MEAN
CFS

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	219940.	265020.	280050.	271170.	305580.	310430.	304450.	304250.	299120.	269820.	264210.	261210.
2	220160.	265030.	279990.	278440.	307330.	309980.	305580.	303760.	298690.	270390.	263900.	260960.
3	220880.	264920.	280440.	291160.	307090.	309780.	306190.	304230.	299230.	269980.	264170.	261240.
4	229970.	264970.	280530.	298200.	306920.	310330.	303340.	303960.	299040.	257210.	263720.	257690.
5	230030.	265110.	280910.	297950.	306950.	310130.	302898.	304080.	298930.	273220.	263940.	245730.
6	233120.	265070.	280740.	290390.	307390.	310100.	302950.	304360.	279630.	273490.	264070.	251500.
7	239980.	265030.	280650.	278310.	306660.	309880.	303170.	304830.	303020.	273310.	264870.	256930.
8	239960.	265080.	280790.	278350.	307120.	310190.	302970.	307180.	303350.	272970.	265550.	260930.
9	242110.	264910.	280860.	258030.	308930.	309780.	302940.	307240.	303000.	270180.	265000.	261080.
10	247340.	264960.	280580.	258160.	309210.	310390.	303330.	306740.	303250.	267880.	264900.	260580.
11	250220.	265220.	280620.	261800.	309020.	309550.	305340.	306810.	302530.	268110.	265120.	261300.
12	249900.	265120.	280380.	271880.	308890.	310540.	307390.	307400.	297280.	268250.	264610.	264090.
13	250050.	265220.	280130.	282410.	308950.	308210.	305130.	306810.	296920.	267890.	265150.	263440.
14	249840.	265130.	280100.	287770.	309070.	307940.	311920.	307080.	296870.	267940.	259230.	264410.
15	250130.	278090.	279980.	288170.	309350.	307910.	311970.	303980.	297060.	268150.	270880.	263910.
16	249930.	269920.	279840.	289980.	309270.	308340.	312060.	304160.	297240.	267630.	265130.	264050.
17	255010.	270170.	279650.	293050.	308780.	307850.	310530.	303970.	296790.	264880.	265000.	263870.
18	255100.	270230.	279730.	293270.	309270.	307970.	300360.	303930.	297280.	265680.	264670.	264100.
19	255060.	269680.	279280.	292770.	309070.	308410.	299760.	304010.	268400.	264920.	265210.	264260.
20	254940.	270180.	280000.	295960.	308570.	307960.	300130.	303930.	280060.	265060.	265190.	263940.
21	260020.	269980.	286170.	298990.	309600.	308120.	299860.	304400.	283260.	265000.	246990.	239990.
22	260030.	280050.	286120.	303510.	309460.	307860.	300380.	303080.	282870.	265120.	261210.	239910.
23	260060.	279910.	286320.	305010.	309890.	308120.	299700.	302870.	282550.	265040.	262500.	240130.
24	259980.	280070.	286550.	305178.	310080.	308320.	300160.	302940.	282840.	265370.	262300.	239980.
25	260070.	280040.	285900.	305490.	309510.	307340.	305990.	303100.	280680.	264880.	262780.	239840.
26	259820.	280060.	285820.	305740.	310380.	307800.	306040.	302580.	270300.	265160.	262410.	219680.
27	260130.	280020.	286230.	305170.	310230.	307090.	306000.	303310.	269890.	265090.	262550.	220430.
28	260070.	280060.	283390.	305520.	309970.	306290.	306060.	303430.	269850.	264880.	261120.	220050.
29	260008.	280090.	271230.	305580.	310370.	305490.	305920.	299120.	270200.	264970.	260970.	219950.
30	260070.	—	270970.	305810.	309940.	307200.	305890.	298630.	269940.	265190.	261520.	220070.
31	260110.	--	270990.	--	309850.	—	306260.	299180.	--	263880.	--	219960.
MEAN	248491.	270391.	280805.	289857.	308797.	308641.	304668.	304044.	289342.	267146.	263296.	249524.
MAX	260130.	280090.	286550.	305810.	310380.	310540.	312060.	307400.	303350.	273490.	270880.	264410.
MIN	219940.	264910.	270970.	258030.	305580.	305490.	299700.	298630.	268400.	257210.	246990.	219680.
S.D.	13144.	6392.	4091.	15079.	1267.	1345.	3589.	2227.	12526.	3456.	3710.	16967.
VAR	********	********	********	********	1606363.	1810131.	********	4961724.	********	********	********	********

366	NOBS	280485.000000	MEDIAN	92360.000000	RANGE
282084.972678	ARITHMETIC MEAN	281109.450326	GEOMETRIC MEAN	280100.618100	HARMONIC MEAN
**********	VARIANCE	23102.352756	STANDARD DEVIATION	.081899	COEFFICIENT OF VARIATION

TABLE A.1

Table A.2: Daily mean loading (metric tons/day) of material outputs from Lake Ontario to the St. Lawrence River in 1984.

Parameters	nobs	mean	st. dev.	median
Discharge (CFS)	366	282085	23102	280451
T. Phosphorus	344	7.7	2.0	7.5
Nitrate+nitrite	343	163.3	56.3	166.6
T. Kjeldahl N.	346	167.7	40.4	161.0
Silica Reac.	50	269.0	95.3	245.0
Calcium	50	25266.6	2233.9	25098.3
Magnesium	50	5335.4	428.9	5329.5
Sulphate	52	18841.3	1710.8	19104.6
Chloride	51	17339.7	1628.8	17542.8
Sodium	51	8517.0	896.8	8405.1
Potassium	48	976.1	74.2	999.5
T. Alkalinity	51	63702.3	5901.2	64455.0
Iron T.	50	25.6	15.8	20.1
Copper T.	42	9.9	10.0	8.0
Zinc T.	50	1.6	1.1	1.4
Aluminum E.	50	10.2	7.0	7.9

nobs: Number of observations.
st. dev.: Standard deviation.

APPENDIX B

NUTRIENT LOADINGS

STATICN NUMBER - 0D0N02MA0030000 AVERAGE DEPTH(M) -
REGICN - ONTARIO WATER TYPE - SURFACE (STREAM-CHANNEL)
LOCATICN - LAT. 044/11/60 LONG. 076/13/59

NARRATIVE # ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S)(122M-480FT FRCMCANADIAN SHORE)

PARAMETER CODE 15413P. PHCSPHORUS
TOTAL
P
MG/L

DAILY LCADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	5.2808	8.2461	8.2335	6.1786	--	7.4534	8.8762	10.7339	8.2811	8.3293	7.1852	5.2477
2	5.6897	5.7790	9.1235	7.5722	--	6.1508	10.4814	12.1307	9.2267	7.2208	7.5008	5.5624
3	5.2382	6.1011	7.5579	10.4861	9.5551	8.8039	8.8520	13.5656	11.8031	8.2028	6.5369	5.8883
4	9.2405	6.8613	7.1479	7.2328	7.6944	--	--	6.8513	11.2095	7.1839	6.5258	5.8083
5	7.3265	5.3910	7.5017	9.4897	8.2723	--	--	11.3239	8.2759	7.8319	5.8845	6.3214
6	7.9968	5.3902	5.7088	6.7588	8.2088	5.6221	6.4574	7.9788	5.3437	5.8294	7.8284	5.5456
7	6.1147	6.2984	7.0134	8.1823	6.5365	6.9847	8.9132	5.7506	9.7254	5.4908	5.3661	4.2805
8	10.5234	8.2480	7.4297	8.9418	5.5681	10.1838	11.1341	8.8053	8.6212	7.4903	4.5542	5.9453
9	6.1096	6.2307	6.7434	8.4079	8.0986	9.5629	11.1330	9.7103	5.6419	6.7518	4.2201	5.9487
10	6.3628	4.3493	7.2179	7.0839	9.1665	7.6806	11.6676	9.5442	9.2127	7.4163	6.6199	5.6181
11	6.6286	5.8481	7.6315	6.3580	8.5552	12.6652	9.5755	10.6739	8.5979	6.9628	5.9758	7.8743
12	6.8573	4.6118	8.1745	6.9275	6.5840	10.1958	9.0373	6.1757	6.2637	6.9665	6.4829	10.8699
13	4.9010	4.5485	7.2750	7.4858	5.8283	11.1757	6.8776	10.6739	9.8934	5.9726	--	6.5188
14	--	5.8461	7.5487	9.4475	9.6167	6.4125	10.0111	10.6833	10.8372	6.1058	7.2403	6.0246
15	7.5377	6.4187	5.8306	9.4686	8.1854	6.7894	10.5477	9.8307	7.5691	6.4383	11.6803	6.0132
16	5.8171	2.2243	8.6387	6.8283	7.7297	7.2522	12.7679	13.6370	5.0248	7.0159	6.8205	5.0460
17	6.6226	6.4868	6.4403	9.7644	10.1372	9.7298	12.4771	9.0857	6.4715	7.9173	7.9858	7.6285
18	5.7588	7.0179	5.7568	8.5583	12.6538	9.7334	8.3155	10.2014	5.8995	--	5.8360	6.0178
19	6.9988	7.2018	9.1688	8.8944	8.9352	--	7.9316	7.2248	--	4.4136	7.3423	7.2518
20	7.2454	7.5461	8.6436	7.4686	8.8453	7.5458	9.9268	14.3713	5.2833	2.3908	6.6921	8.2125
21	7.5172	6.8791	10.4466	8.2775	10.6951	8.8323	8.3756	4.9967	6.1765	5.7134	4.7200	4.2334
22	7.1352	--	4.2761	7.7334	6.8994	7.0908	10.3766	7.8710	7.2075	7.5347	5.4397	5.9954
23	6.8529	--	7.8566	8.6684	7.9719	8.8323	9.9860	5.8620	6.3687	6.0389	4.5019	8.4718
24	--	--	3.8613	10.3926	10.4838	8.3092	10.1484	8.4611	7.4147	6.2415	8.7398	9.8188
25	6.8815	--	8.6156	7.7090	9.2513	9.3370	10.1206	8.4656	8.1832	7.6577	7.1463	9.8131
26	7.0021	--	8.5432	9.5880	6.0834	7.9938	14.2462	5.1151	6.0263	5.5869	8.2935	5.4360
27	8.1577	--	6.1711	--	6.9166	8.3513	8.6216	7.1339	9.8523	4.9368	6.7541	5.9946
28	5.2885	--	--	5.9882	12.0749	7.3540	7.9484	7.1367	6.2146	6.2300	5.6297	5.7147
29	6.4974	13.3127	7.5755	9.0589	6.9957	9.2059	7.8698	7.7681	7.8777	6.8813	7.9922	5.1193
30	5.2885	--	7.5018	7.2676	8.2018	10.7628	11.0166	8.4871	7.5394	4.9378	5.6384	4.6908
31	6.8188	--	8.2991	--	6.5023	--	11.1057	8.1362	--	--	--	7.9219
MEAN	6.7167	6.5390	7.3978	8.1444	8.4188	8.5188	9.8206	8.9802	7.7946	6.5754	6.6604	6.4785
MAX	10.5234	13.3127	10.4466	10.4861	12.6538	12.6652	14.2462	14.3713	11.8031	8.3293	11.6803	10.8699
MIN	4.9010	4.3493	3.8613	5.9882	5.5681	5.6221	6.4574	4.9967	5.0248	4.4136	4.2201	4.2334
S.D.	1.2380	1.8564	1.4037	1.2569	1.7276	1.6668	1.7606	2.4526	1.8761	1.0380	1.5235	1.6288
VAR	1.5326	3.4461	1.9703	1.5799	2.9846	2.7783	3.0995	6.0152	3.5199	1.0774	2.3211	2.6529

344	NOBS	7.477175	MEDIAN	10.510069	RANGE
7.688415	ARITHMETIC MEAN *	7.453271	GEOMETRIC MEAN	7.228131	HARMONIC MEAN
3.813307	VARIANCE	1.952769	STANDARD DEVIATION	.253988	COEFFICIENT OF VARIATICN

TABLE 3.1

*: Corrected value : 8.7 MT/day, (see section 6.1).

STATION NUMBER - 00ON02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S)(122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 07112L. NITROGEN
. DISSOLVED
. NO3 & NO2
. N
. MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	150.340	238.293	230.537	220.570	226.345	208.392	176.033	131.193	60.093	79.988	124.932	142.072
2	145.636	222.869	229.802	237.398	227.393	183.748	179.681	153.308	49.795	70.883	235.346	150.248
3	142.887	220.678	225.362	230.489	241.511	212.509	165.787	160.253	43.987	86.650	117.793	154.809
4	160.577	219.422	229.558	252.784	235.362	--	--	93.832	95.977	95.785	120.823	157.204
5	157.801	220.637	202.174	250.382	240.649	--	--	122.179	49.069	93.045	110.570	155.326
6	143.357	200.671	226.978	209.168	233.463	205.131	157.352	132.731	57.548	89.117	139.746	152.811
7	119.354	202.589	217.279	229.787	225.395	201.949	182.721	55.266	54.938	95.085	83.063	142.262
8	188.717	206.524	227.707	225.864	203.160	202.911	164.785	87.301	63.173	117.036	106.047	160.459
9	177.951	215.478	284.876	221.261	--	198.848	158.831	117.427	57.161	100.615	112.970	159.272
10	176.947	212.273	226.162	218.210	240.148	194.677	147.889	93.939	69.838	106.322	128.503	155.136
11	173.490	174.793	226.881	216.155	243.029	194.150	157.097	112.001	74.861	104.442	124.063	173.490
12	183.044	196.162	219.818	211.822	239.143	218.356	203.338	57.238	56.810	90.695	125.121	176.637
13	--	218.979	238.839	235.664	246.758	196.336	158.485	56.376	60.379	120.108	--	158.130
14	--	218.255	225.088	248.173	216.565	135.802	208.906	70.721	111.282	108.971	125.752	176.203
15	188.748	221.676	--	247.812	217.519	167.472	137.579	107.989	96.797	99.859	169.896	171.344
16	180.025	216.908	226.251	238.001	221.252	185.837	179.669	117.740	78.650	121.303	160.443	160.200
17	168.689	214.461	181.563	244.829	215.606	173.473	109.555	91.601	26.904	134.334	148.029	171.964
18	174.999	263.501	195.321	239.264	210.644	171.278	128.779	145.203	107.065	118.467	114.774	166.291
19	189.344	229.929	254.536	246.747	213.536	172.278	150.554	132.579	--	99.954	105.262	179.354
20	190.504	219.102	249.018	227.682	208.655	165.236	153.632	172.754	70.673	114.294	106.553	170.716
21	198.122	224.893	228.564	236.686	213.903	166.832	138.859	120.816	81.196	120.761	110.738	148.758
22	193.033	--	208.896	234.234	197.884	174.233	170.736	123.263	88.708	116.918	123.513	163.403
23	192.418	--	222.370	230.161	205.751	175.890	155.664	69.751	78.916	129.228	129.268	177.672
24	--	--	150.238	240.081	200.560	151.832	158.845	--	78.997	120.929	148.449	179.913
25	207.718	--	214.339	252.228	196.400	154.362	122.197	90.597	73.580	122.653	140.351	176.282
26	219.613	--	239.489	235.955	183.264	155.347	166.455	80.063	86.091	89.651	143.368	151.777
27	221.787	--	219.495	--	196.096	157.998	110.956	--	95.217	114.956	109.352	156.616
28	208.992	--	--	--	197.451	168.842	94.230	60.959	81.980	109.674	134.986	146.102
29	225.498	230.578	220.618	234.334	199.227	171.395	101.933	45.436	95.327	108.412	147.696	165.974
30	235.753	--	219.743	225.520	199.710	176.116	112.415	43.899	83.992	83.813	141.600	161.212
31	226.868	--	209.800	--	203.448	--	130.567	56.440	--	92.450	--	153.848
MEAN	183.651	217.639	225.217	233.608	216.727	180.043	151.023	100.098	73.414	105.045	130.656	162.025
MAX	235.753	263.501	284.876	252.784	246.758	218.356	203.338	172.754	111.282	134.334	235.346	179.913
MIN	119.354	174.793	150.238	209.168	183.264	135.802	98.230	43.899	26.904	70.883	83.063	142.872
S.D.	28.852	16.822	25.312	12.182	17.566	20.696	27.978	36.376	19.905	15.580	27.476	11.252
VAR	832.430	282.988	640.708	148.953	308.566	427.571	782.795	1323.229	396.227	242.745	754.943	126.613

343	NOBS	166.831574	MEDIAN	257.972285	RANGE
163.339193	ARITHMETIC MEAN	151.617211	GEOMETRIC MEAN	137.333720	HARMONIC MEAN
3167.846979	VARIANCE	56.283638	STANDARD DEVIATION	.344581	COEFFICIENT OF VARIATION

TABLE B.2

STATION NUMBER - 000N02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S) (122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 07010L. NITROGEN
: TOTAL
: KJELDAHL
: N
: MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	111.543	138.301	157.122	163.434	220.109	185.575	193.935	154.300	178.814	159.315	121.695	124.793
2	100.327	135.059	170.122	190.328	271.818	148.814	269.522	139.912	198.448	145.078	131.251	118.280
3	121.319	80.483	209.559	157.649	240.759	210.991	247.555	133.420	213.336	137.582	132.679	112.647
4	144.881	105.816	178.010	211.141	200.772	--	--	163.090	147.995	137.376	124.700	115.535
5	141.457	94.830	202.339	197.824	208.312	--	--	162.409	164.785	143.919	132.564	124.020
6	193.047	96.764	164.387	175.730	240.994	175.501	187.784	159.576	167.848	149.421	124.219	115.841
7	147.576	126.618	177.399	222.286	197.596	174.617	191.634	157.582	193.024	146.644	121.350	113.306
8	167.552	100.664	169.232	215.929	215.951	226.470	296.395	162.560	205.868	131.749	122.963	117.627
9	170.240	85.023	206.432	161.836	166.513	263.359	218.950	138.504	165.544	135.698	125.955	118.335
10	126.044	151.902	186.979	108.789	210.603	228.137	218.516	158.569	180.540	134.543	146.028	115.554
11	146.516	183.890	205.568	142.393	231.672	285.918	268.562	143.572	189.747	133.345	134.456	128.037
12	201.432	227.990	184.784	181.181	178.608	201.618	189.029	169.454	161.691	138.015	132.988	152.697
13	137.840	141.004	192.855	178.134	239.189	215.208	205.319	172.887	181.864	118.139	--	127.795
14	--	154.597	204.501	217.151	199.906	200.684	183.409	184.325	124.374	141.137	123.847	128.913
15	163.010	152.196	--	163.090	190.993	182.560	175.795	158.632	138.281	144.533	135.386	132.549
16	184.311	129.616	194.027	194.664	189.428	244.766	206.428	136.370	123.800	126.549	137.709	122.268
17	151.195	146.945	169.230	231.187	196.693	267.753	190.200	148.945	162.151	136.930	130.499	128.803
18	173.749	148.302	224.791	208.368	241.710	244.467	198.688	125.098	136.927	119.118	133.579	148.820
19	156.224	180.375	151.900	193.667	175.675	234.237	182.869	129.599	--	133.056	131.252	137.915
20	218.611	174.090	150.920	231.388	182.195	257.285	201.477	156.372	144.777	124.684	136.440	142.264
21	157.988	168.670	189.301	251.256	191.147	225.713	166.778	167.055	147.125	137.641	110.738	125.239
22	168.824	--	146.508	185.980	183.479	225.523	147.922	187.122	161.476	143.549	115.834	112.854
23	133.881	--	188.281	212.973	208.788	242.321	160.804	147.664	141.911	121.428	122.837	126.488
24	--	--	145.324	189.160	198.281	210.752	153.697	235.278	178.763	158.638	138.809	103.479
25	154.833	--	160.404	212.568	213.840	225.895	187.419	213.125	151.974	136.281	122.324	--
26	119.037	--	186.969	194.087	182.503	177.970	176.203	154.195	154.301	150.067	133.724	105.490
27	145.946	--	161.291	--	216.618	201.635	218.163	156.053	142.826	131.843	155.666	106.391
28	144.638	--	--	207.341	257.446	211.618	164.216	231.198	146.110	143.419	143.942	106.207
29	140.140	174.986	184.070	253.051	206.831	232.768	159.897	201.532	131.736	137.625	125.318	98.615
30	159.938	--	199.163	248.746	195.154	218.266	180.613	--	138.884	119.548	131.348	108.913
31	121.718	--	219.095	--	201.929	--	186.846	181.049	--	119.604	--	107.780
MEAN	151.858	140.824	181.813	196.589	208.242	218.586	197.504	164.315	161.205	136.660	130.345	120.888
MAX	218.611	227.990	224.791	253.051	271.818	285.918	298.395	235.278	213.336	159.315	155.666	152.697
MIN	100.327	80.483	145.324	108.789	166.513	148.814	147.922	125.098	123.800	118.139	110.738	98.615
S.D.	26.784	36.916	21.973	33.047	25.027	31.560	35.847	27.382	24.182	10.858	9.260	13.103
VAR	717.398	1362.773	482.795	1092.137	626.337	996.038	1285.012	749.797	584.780	117.717	85.744	173.778

346	NOBS	161.583466	MEDIAN	217.912457	RANGE
167.706594	ARITHMETIC MEAN	162.975263	GEOMETRIC MEAN	158.371574	HARMONIC MEAN
1633.533315	VARIANCE	40.416993	STANDARD DEVIATION	.240998	COEFFICIENT OF VARIATION

TABLE B.3

STATION NUMBER - 00ON02MA0030800
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S) (122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 14106L. SILICA
REACTIVE
SIO2
MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	231.371	--	--
2	210.363	--	--	341.089	--	--	187.168	--	--	--	--	--
3	--	--	--	--	--	--	--	223.609	234.596	--	--	--
4	--	--	--	--	187.989	--	--	--	--	--	--	--
5	--	--	295.939	--	--	--	--	--	--	--	232.795	--
6	--	246.780	--	--	--	--	--	313.186	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
9	243.199	--	--	385.626	--	--	126.175	--	--	--	--	--
10	--	--	--	--	--	--	--	--	230.318	--	--	287.289
11	--	--	--	--	--	151.688	119.693	--	--	--	--	--
12	--	--	267.903	--	--	--	--	--	--	--	233.386	336.451
13	--	506.835	--	--	--	--	--	210.472	276.433	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	197.098	--	--
16	195.945	--	--	561.256	--	--	191.137	--	--	--	--	--
17	--	--	--	--	--	--	--	--	305.397	421.821	--	329.706
18	--	--	--	--	--	173.541	--	--	--	--	--	--
19	--	--	348.960	--	--	--	--	--	--	--	350.873	--
20	--	291.254	--	--	--	--	--	446.777	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	188.368	--	--
23	203.887	--	--	396.055	--	--	256.993	--	--	--	--	--
24	--	--	--	--	98.760	--	--	--	256.394	--	--	235.180
25	--	--	--	--	--	135.537	--	--	--	--	--	--
26	--	--	329.122	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--
28	--	--	--	--	394.902	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	207.736	--	--
30	299.471	--	272.189	352.140	--	--	224.829	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	242.506
MEAN	230.573	348.290	382.823	407.233	227.217	153.586	184.332	298.511	260.628	249.277	272.351	286.226
MAX	299.471	506.835	348.960	561.256	394.902	173.541	256.993	446.777	305.397	421.821	350.873	336.451
MIN	195.945	246.780	267.903	341.089	98.760	135.537	119.693	210.472	230.318	188.368	232.795	235.180
S.D.	42.503	139.093	35.445	89.058	151.918	19.074	53.916	108.072	31.098	97.798	68.802	47.253
VAR	1806.497	********	1256.373	7931.386	********	363.805	2906.882	********	967.871	9562.884	4624.309	2232.885

52	NOBS	244.989833	MEDIAN	462.495810	RANGE
269.883319	ARITHMETIC MEAN	253.066527	GEOMETRIC MEAN	237.259375	HARMONIC MEAN
9077.695442	VARIANCE	95.276941	STANDARD DEVIATION	.354185	COEFFICIENT OF VARIATION

TABLE B.4

APPENDIX C

MAJOR IONS LOADINGS

STATION NUMBER - 08ON02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S) (122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 20108L. CALCIUM
DISSOLVED
CA
MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	23084.85	--	--
2	20227.20	--	--	25240.59	--	--	28973.57	--	--	--	--	--
3	--	--	--	--	--	--	--	26162.26	23972.81	--	--	--
4	--	--	--	--	27671.91	--	--	--	--	--	--	--
5	--	--	26083.90	--	--	--	--	--	--	--	23473.58	--
6	--	24483.19	--	--	--	--	--	26844.55	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
9	22125.22	--	--	22568.59	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	25335.02	--	--	24132.31
11	--	--	--	--	--	29653.34	27903.50	--	--	--	--	--
12	--	--	25553.83	--	--	--	--	--	--	--	23403.43	24918.29
13	--	24497.85	--	--	--	--	--	24955.93	25242.65	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	23322.35	--	--
16	23287.25	--	--	26712.96	--	--	28670.51	--	--	--	--	--
17	--	--	--	--	--	--	--	--	26249.59	24270.95	--	24566.38
18	--	--	--	--	--	30181.08	--	--	--	--	--	--
19	--	--	25864.12	--	--	--	--	--	--	--	23586.45	--
20	--	25617.12	--	--	--	--	--	27178.94	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	23513.49	--	--
23	23765.58	--	--	27649.16	--	--	26727.25	--	--	--	--	--
24	--	--	--	--	26969.21	--	--	--	24045.64	--	--	22753.78
25	--	--	--	--	--	29291.04	--	--	--	--	--	--
26	--	--	25559.45	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--
28	--	--	--	--	--	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	--	--	--
30	23893.93	--	24696.21	28171.22	--	--	26529.84	--	--	23759.86	--	--
31	--	--	--	--	--	--	--	--	--	--	--	20154.93
MEAN	22643.84	24865.78	25551.58	26068.50	27328.56	29708.48	27760.93	26285.42	24969.14	23574.38	23487.80	23303.51
MAX	23893.93	25617.12	26083.90	28171.22	27671.91	30181.08	28973.57	27178.94	26249.59	24270.95	23586.45	24918.29
MIN	20227.20	24483.19	24696.21	22568.59	26969.21	29291.04	26529.84	24955.93	23972.81	23084.85	23403.43	20154.93
S.D.	1520.49	658.71	527.44	2251.11	496.88	447.57	1187.05	982.13	960.96	477.29	92.34	1941.89
VAR	********	********	********	********	********	********	********	********	********	********	8527.26	********

50	NOBS	25898.255700	MEDIAN	10026.125200	RANGE
25266.552178	ARITHMETIC MEAN	25169.505399	GEOMETRIC MEAN	25072.018668	HARMONIC MEAN
4990427.962632	VARIANCE	2233.926508	STANDARD DEVIATION	.088414	COEFFICIENT OF VARIATION

TABLE C.1

STATION NUMBER - 00ON02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S)(122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 12186L. MAGNESIUM
. DISSOLVED
.
. MG
. MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	5222.4	--	--
2	4153.3	--	--	5252.8	--	--	5989.4	--	--	--	--	--
3	--	--	--	--	--	--	--	5739.3	5498.4	--	--	--
4	--	--	--	--	5639.7	--	--	--	--	--	--	--
5	--	--	5368.2	--	--	--	--	--	--	--	5173.2	--
6	--	5080.5	--	--	--	--	--	5667.2	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
9	4508.1	--	--	4678.1	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	5795.1	--	--	5171.2
11	--	--	--	--	--	5763.8	5984.7	--	--	--	--	--
12	--	--	5358.1	--	--	--	--	--	--	--	5186.4	5305.6
13	--	5083.4	--	--	--	--	--	5562.5	5892.4	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	5124.3	--	--
16	4776.2	--	--	5470.5	--	--	5963.5	--	--	--	--	--
17	--	--	--	--	--	--	--	--	5671.7	5191.6	--	5236.5
18	--	--	--	--	--	5960.8	--	--	--	--	--	--
19	--	--	5337.8	--	--	--	--	--	--	--	5263.1	--
20	--	5163.1	--	--	--	--	--	5659.2	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	5196.4	--	--
23	4986.8	--	--	5529.8	--	--	5853.8	--	--	--	--	--
24	--	--	--	--	5469.8	--	--	--	5485.1	--	--	4762.4
25	--	--	--	--	--	6023.9	--	--	--	--	--	--
26	--	--	5322.8	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--
28	--	--	--	--	--	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	--	--	--
30	4842.5	--	5045.5	5694.2	--	--	5695.7	--	--	5128.5	--	--
31	--	--	--	--	--	--	--	--	--	--	--	4365.1
MEAN	4637.2	5055.7	5286.1	5325.1	5554.7	5916.1	5857.4	5657.0	5652.5	5172.6	5207.6	4968.2
MAX	4986.0	5163.1	5368.2	5694.2	5639.7	6023.9	5989.4	5739.3	5892.4	5222.4	5263.1	5305.6
MIN	4153.3	5000.5	5045.5	4678.1	5469.8	5763.8	5653.8	5562.5	5485.1	5124.3	5173.2	4365.1
S.D.	318.1	93.1	135.7	394.7	120.1	135.6	167.7	72.6	202.0	43.8	46.5	397.8
VAR	96135.5	8661.6	18426.4	155782.8	14423.5	18398.2	28113.6	5272.8	40886.8	1919.3	2356.2	158272.4

58	NOBS	5329.504600	MEDIAN	1878.545600	RANGE
5335.430121	ARITHMETIC MEAN	5317.899994	GEOMETRIC MEAN	5299.680325	HARMONIC MEAN
163967.687192	VARIANCE	428.914452	STANDARD DEVIATION	.080398	COEFFICIENT OF VARIATION

TABLE C.2

STATION NUMBER - 00ON02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S) (122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 16307L. SULPHATE
: DISSOLVED
:
: SO4
: MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	18509.7	--	--
2	15156.9	--	--	19169.2	--	--	20663.3	--	--	--	--	--
3	--	--	--	--	--	--	--	20795.6	19940.7	--	--	--
4	--	--	--	--	20453.1	--	--	--	--	--	--	--
5	--	--	19488.1	--	--	--	--	--	--	--	16877.6	--
6	--	17924.0	--	--	--	--	--	20953.7	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
9	16668.1	--	--	16752.6	--	--	20113.7	--	--	--	--	--
10	--	--	--	--	--	--	--	--	20654.4	--	--	16343.6
11	--	--	--	--	--	20325.1	20273.0	--	--	--	--	--
12	--	--	18898.6	--	--	--	--	--	--	--	16726.8	17016.6
13	--	18389.8	--	--	--	--	--	19919.6	20296.0	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	17869.5	--	--
16	16958.3	--	--	19040.1	--	--	19954.7	--	--	--	--	--
17	--	--	--	--	--	--	--	--	20214.4	17911.2	--	17713.6
18	--	--	--	--	--	20980.4	--	--	--	--	--	--
19	--	--	19821.8	--	--	--	--	--	--	--	16893.9	--
20	--	18600.5	--	--	--	--	--	20775.1	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	18512.0	--	--
23	18831.3	--	--	20550.0	--	--	20706.3	--	--	--	--	--
24	--	--	--	--	20359.9	--	--	--	19402.8	--	--	15815.9
25	--	--	--	--	--	20330.5	--	--	--	--	--	--
26	--	--	19397.2	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--
28	--	--	--	--	19669.1	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	16878.6	--	--
30	17984.5	--	18389.4	20603.9	--	--	21859.0	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	14119.2
MEAN	16932.2	18304.5	19021.4	19223.2	20160.7	20518.7	20461.7	20611.0	20101.6	17936.2	16832.5	16281.8
MAX	18831.3	18600.5	19488.1	20603.9	20453.1	20980.4	21859.0	20953.7	20654.4	18512.0	16893.9	17713.6
MIN	15156.9	17924.0	18389.4	16752.6	19669.1	20325.1	19954.7	19919.6	19402.8	16878.6	16726.8	14119.2
S.D.	1169.3	346.1	420.5	1565.8	420.3	330.6	417.4	467.8	466.4	667.4	92.6	1182.5
VAR	********	119778.4	176820.8	********	183486.6	109292.8	174199.8	218810.4	217554.1	446882.7	8573.9	********

52	NOOS	19104.644300	MEDIAN	6939.764658	RANGE
18841.256061	ARITHMETIC MEAN	18761.311782	GEOMETRIC MEAN	18677.433485	HARMONIC MEAN
2926989.340832	VARIANCE	1718.021247	STANDARD DEVIATION	.098802	COEFFICIENT OF VARIATION

TABLE C.3

STATION NUMBER - 02ON02MA0030800
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S)(122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 17208L. CHLORIDE
. DISSOLVED
: CL
. MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	16592.6	--	--
2	13430.9	--	--	17327.3	--	--	18391.1	--	--	--	--	--
3	--	--	--	--	--	--	--	18335.9	17741.3	--	--	--
4	--	--	--	--	19400.4	--	--	--	--	--	--	--
5	--	--	17205.7	--	--	--	--	--	--	--	16554.3	--
6	--	16040.7	--	--	--	--	--	19387.7	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
9	14888.6	--	--	--	--	--	19742.6	--	--	--	--	--
10	--	--	--	--	--	--	--	--	18425.5	--	--	15832.8
11	--	--	--	--	--	19945.9	18926.5	--	--	--	--	--
12	--	--	17585.4	--	--	--	--	--	--	--	16142.5	16175.5
13	--	16244.7	--	--	--	--	--	18641.8	18259.1	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	15767.2	--	--
16	15675.6	--	--	17974.4	--	--	19648.9	--	--	--	--	--
17	--	--	--	--	--	--	--	--	18033.0	15899.4	--	15580.2
18	--	--	--	--	--	20145.9	--	--	--	--	--	--
19	--	--	17721.7	--	--	--	--	--	--	--	16504.0	--
20	--	16482.3	--	--	--	--	--	18317.9	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	15978.8	--	--
23	16311.8	--	--	18388.2	--	--	18430.1	--	--	--	--	--
24	--	--	--	--	18640.5	--	--	--	17462.5	--	--	14228.4
25	--	--	--	--	--	19728.2	--	--	--	--	--	--
26	--	--	18136.7	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--
28	--	--	--	--	17542.8	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	16229.4	--	--
30	16128.4	--	16796.1	18431.2	--	--	18585.9	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	13526.4
MEAN	15285.3	16255.9	17489.1	18010.3	18594.5	19940.0	19070.8	18670.8	17984.3	16093.5	16400.3	15068.7
MAX	16311.8	16482.3	18136.7	18431.2	19400.4	20145.9	19742.6	19387.7	18425.5	16592.6	16554.3	16175.5
MIN	13430.9	16040.7	16796.1	17327.3	17542.8	19728.2	18430.1	18317.9	17462.5	15767.2	16142.5	13526.4
S.D.	1172.4	221.0	510.7	494.5	952.9	208.6	539.0	500.5	388.5	325.9	224.6	1135.3
VAR	********	48851.1	260840.6	244546.8	908083.2	43645.8	290482.1	250509.9	150942.4	106289.7	50461.2	********

51	NOBS	17542.752150	MEDIAN	6714.996758	RANGE
17339.723484	ARITHMETIC MEAN	17262.356408	GEOMETRIC MEAN	17182.494622	HARMONIC MEAN
2653127.433394	VARIANCE	1628.842360	STANDARD DEVIATION	.093937	COEFFICIENT OF VARIATION

TABLE C.4

STATION NUMBER - 00ON02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S) (22M-480FT FROMCANADIAN SHORE)

PARAMETER CODE 11107L. SODIUM
DISSOLVED
NA
MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	8197.1	--	--
2	6634.5	--	--	8186.1	--	--	9208.7	--	--	--	--	--
3	--	--	--	--	--	--	--	9689.7	9310.5	--	--	--
4	--	--	--	--	9249.0	--	--	--	--	--	--	--
5	--	--	8534.0	--	--	--	--	--	--	--	7824.5	--
6	--	8117.8	--	--	--	--	--	10066.7	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
9	7355.3	--	--	7270.0	--	--	9203.3	--	--	--	--	--
10	--	--	--	--	--	--	--	--	9064.1	--	--	7852.6
11	--	--	--	--	--	9555.8	9051.8	--	--	--	--	--
12	--	--	8380.6	--	--	--	--	--	--	--	7779.5	8087.8
13	--	8057.4	--	--	--	--	--	10072.6	9165.9	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	7817.9	--	--
16	7715.3	--	--	8596.5	--	--	9556.8	--	--	--	--	--
17	--	--	--	--	--	--	--	--	8943.8	7722.6	--	8016.4
18	--	--	--	--	--	9733.4	--	--	--	--	--	--
19	--	--	8279.3	--	--	--	--	--	--	--	7862.2	--
20	--	8141.9	--	--	--	--	--	9903.6	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	7469.8	--	--
23	7980.6	--	--	8817.8	--	--	10059.4	--	--	--	--	--
24	--	--	--	--	8736.5	--	--	--	8523.4	--	--	7231.8
25	--	--	--	--	--	9562.9	--	--	--	--	--	--
26	--	--	8543.2	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--
28	--	--	--	--	8429.6	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	7855.8	--	--
30	7988.9	--	7966.5	8915.9	--	--	10192.3	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	6574.6
MEAN	7501.3	8105.7	8340.7	8357.3	8805.1	9617.4	9545.4	9933.1	9081.6	7812.5	7822.1	7551.6
MAX	7980.9	8141.9	8543.2	8915.9	9249.0	9733.4	10192.3	10072.6	9310.5	8197.1	7862.2	8087.8
MIN	6634.5	8057.4	7966.5	7270.8	8429.6	9555.8	9051.8	9669.7	8523.4	7469.8	7779.5	6574.6
S.D.	533.3	43.5	236.5	669.5	414.0	100.5	481.0	160.2	269.3	262.4	41.4	642.4
VAR	284398.3	1894.4	55937.2	448211.1	171378.8	10189.8	231367.0	32469.1	89598.3	68834.9	1710.8	412713.8

52 NOBS

8517.822548	ARITHMETIC MEAN	8405.096175	MEDIAN	3617.650488	RANGE
804218.334577	VARIANCE	8470.48039	GEOMETRIC MEAN	8423.703481	HARMONIC MEAN
		896.777751	STANDARD DEVIATION	.105292	COEFFICIENT OF VARIATION

TABLE C.3

STATION NUMBER - 00ON02MAQ030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S)(122M-480FT FROMCANADIAN SHORE)

PARAMETER CODE 19107L. POTASSIUM
DISSOLVED
K
MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	925.5	--	--
2	798.3	--	--	955.8	--	--	1840.7	--	--	--	--	--
3	--	--	--	--	--	--	--	1043.5	1019.0	--	--	--
4	--	--	--	--	1067.8	--	--	--	--	--	--	--
5	--	--	1832.3	--	--	--	--	--	--	--	918.2	--
6	--	987.1	--	--	--	--	--	1029.0	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
9	877.9	--	--	866.1	--	--	1839.1	--	--	--	--	--
10	--	--	--	--	--	--	--	--	1017.9	--	--	893.8
11	--	--	--	--	--	1023.8	1832.4	--	--	--	--	--
12	--	--	961.7	--	--	--	--	--	--	--	901.1	925.2
13	--	974.7	--	--	--	--	--	999.7	1018.4	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	913.2	--	--
16	918.5	--	--	1015.9	--	--	1100.9	--	--	--	--	--
17	--	--	--	--	--	--	--	--	1018.7	902.8	--	918.8
18	--	--	--	--	--	1033.7	--	--	--	--	--	--
19	--	--	978.5	--	--	--	--	--	--	--	--	--
20	--	999.5	--	--	--	--	--	1035.8	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	935.3	--	--
23	955.7	--	--	1046.2	--	--	1842.7	--	--	--	--	--
24	--	--	--	--	1056.0	--	--	--	949.4	--	--	834.9
25	--	--	--	--	--	1046.6	--	--	--	--	--	--
26	--	--	1808.4	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--
28	--	--	--	--	1025.2	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	921.8	--	--
30	949.4	--	949.3	1063.9	--	--	1071.7	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	749.1
MEAN	900.8	987.1	986.0	989.4	1049.7	1034.7	1854.6	1026.8	1003.1	919.6	909.7	864.2
MAX	955.7	999.5	1832.3	1063.9	1067.8	1046.6	1100.9	1043.5	1019.0	935.3	918.2	925.2
MIN	798.3	974.7	949.3	866.1	1025.2	1023.8	1832.4	999.7	949.4	902.8	901.1	749.1
S.D.	64.6	12.4	34.1	80.4	22.0	11.4	26.5	19.0	30.2	12.6	12.1	73.5
VAR	4179.3	154.3	1159.8	6467.4	482.5	130.9	702.6	361.4	913.4	159.2	146.5	5402.3

51	NOBS	999.530910	MEDIAN	351.873908	RANGE
976.879194	ARITHMETIC MEAN	973.173084	GEOMETRIC MEAN	970.109391	HARMONIC MEAN
5499.218758	VARIANCE	74.156717	STANDARD DEVIATION	.075974	COEFFICIENT OF VARIATION

TABLE C.6

STATION NUMBER - 08ON02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59
AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN WANFORD PT AND US SHORE (RANGE 179-S)(122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 18116L. ALKALINITY
: TOTAL
: UNFILT
: CACO3
: MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	58768.1	--	--
2	58818.7	--	--	66853.4	--	--	73878.3	--	--	--	--	--
3	--	--	--	--	--	--	--	68051.7	63560.9	--	--	--
4	--	--	--	--	78382.9	--	--	--	--	--	--	--
5	--	--	69898.2	--	--	--	--	--	--	--	57681.4	--
6	--	65526.6	--	--	--	--	--	65918.3	--	--	--	--
7	--	--	--	--	--	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	--	--	--
9	55639.3	--	--	59424.3	--	--	--	--	--	--	--	--
10	--	--	--	--	--	--	--	--	63523.3	--	--	56691.8
11	--	--	--	--	--	71896.1	71142.7	--	--	--	--	--
12	--	--	68349.6	--	--	--	--	--	--	--	59643.1	68172.9
13	--	65843.9	--	--	--	--	--	64494.5	63361.2	--	--	--
14	--	--	--	--	--	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	57221.9	--	--
16	58848.7	--	--	66853.4	--	--	73898.7	--	--	--	--	--
17	--	--	--	--	--	--	--	--	60134.1	57237.9	--	68252.1
18	--	--	--	--	--	73566.3	--	--	--	--	--	--
19	--	--	64455.0	--	--	--	--	--	--	--	60688.0	--
20	--	61759.1	--	--	--	--	--	67835.7	--	--	--	--
21	--	--	--	--	--	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	55990.7	--	--
23	68529.8	--	--	68525.1	--	--	68586.9	--	--	--	--	--
24	--	--	--	--	69360.2	--	--	--	59317.2	--	--	55737.8
25	--	--	--	--	--	73717.8	--	--	--	--	--	--
26	--	--	66524.6	--	--	--	--	--	--	--	--	--
27	--	--	--	--	--	--	--	--	--	--	--	--
28	--	--	--	--	64627.2	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	59659.3	--	--
30	64545.5	--	62802.7	69454.8	--	--	78871.8	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	49281.8
MEAN	57914.6	64109.9	66246.8	66222.1	68123.4	73059.8	71176.5	66575.8	61979.4	57775.6	59337.5	56411.3
MAX	64545.5	65526.6	69898.2	69454.8	70382.9	73717.8	73890.7	68051.7	63560.9	59659.3	60688.0	68252.1
MIN	58818.7	61759.1	62802.7	59424.3	64627.2	71896.1	68586.9	64494.5	59317.2	55990.7	57681.4	49281.8
S.D.	5159.1	2058.1	2631.6	3960.9	3870.7	1810.6	1974.8	1686.2	2078.5	1441.8	1526.4	4513.4
VAR	********	********	********	********	********	********	********	********	********	********	********	********

51	NOBS				
63782.337284	ARITHMETIC MEAN	64455.031208	MEDIAN	24515.283188	RANGE
34823815.597158	VARIANCE	63428.189511	GEOMETRIC MEAN	63147.642833	HARMONIC MEAN
		5981.170697	STANDARD DEVIATION	.092637	COEFFICIENT OF VARIATION

TABLE C.7

APPENDIX D

TRACE METAL LOADINGS

STATION NUMBER - 08ON02MA0038000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S)(122M-480FT FROMCANADIAN SHORE)

PARAMETER CODE 26004P. IRON
26006P. TOTAL
: FE
: MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	28.43	--	--
2	53.94	--	--	40.93	--	--	8.98	--	--	--	--	--
3	--	--	--	--	--	--	--	16.40	36.66	--	--	--
4	--	--	--	--	10.53	--	--	--	--	--	--	--
5	--	--	34.41	--	--	--	--	--	--	--	18.11	--
6	--	32.47	--	--	--	--	--	4.47	--	--	--	--
7	--	--	--	--	27.80	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	13.38	--	--
9	73.55	--	--	31.61	--	--	9.65	--	--	--	--	--
10	--	--	--	--	--	--	--	--	23.77	--	--	38.31
11	--	--	--	--	--	8.34	18.70	--	--	--	--	--
12	--	--	56.33	--	--	--	--	--	--	--	20.10	--
13	--	13.00	--	--	--	--	--	21.80	42.92	--	--	--
14	--	--	--	--	33.32	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	11.17	--	--
16	42.86	--	--	39.79	--	--	11.47	--	--	--	--	--
17	--	--	--	--	--	--	--	--	15.27	--	--	38.79
18	--	--	--	--	--	12.07	--	--	--	7.16	--	--
19	--	--	26.69	--	--	--	--	--	--	--	14.29	--
20	--	39.72	--	--	--	--	--	16.38	--	--	--	--
21	--	--	--	--	36.41	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	16.89	--	--
23	--	--	--	58.87	--	--	9.55	--	--	--	--	--
24	--	--	--	--	22.79	--	--	--	40.19	--	--	23.52
25	--	--	--	--	--	10.54	--	--	--	--	--	--
26	--	--	17.51	--	--	--	--	--	--	--	12.86	--
27	--	--	--	18.69	--	--	--	--	--	--	--	--
28	--	--	--	--	7.59	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	10.39	--	--
30	38.23	--	--	65.93	--	--	17.24	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	16.17
MEAN	52.15	28.39	33.73	41.17	23.07	10.32	12.60	14.76	31.76	14.57	16.34	29.19
MAX	73.55	39.72	56.33	65.93	36.41	12.07	18.70	21.80	42.92	28.43	20.10	38.79
MIN	38.23	13.00	17.51	18.69	7.59	8.34	8.98	4.47	15.27	7.16	12.86	16.17
S.D.	15.72	13.82	16.57	16.87	11.85	1.87	4.27	7.32	11.78	7.52	3.34	11.21
VAR	247.18	190.96	274.66	258.28	140.44	3.52	18.23	53.55	138.82	56.55	11.18	125.66

55	NOBS	20.097130	MEDIAN	69.078926	RANGE
25.601836	ARITHMETIC MEAN	21.138947	GEOMETRIC MEAN	17.275034	HARMONIC MEAN
250.878568	VARIANCE	15.838894	STANDARD DEVIATION	.618662	COEFFICIENT OF VARIATION

TABLE D.1

STATION NUMBER - 000ND2MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S) (122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 30085P. ZINC TOTAL ZN MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	.6611	--	--
2	.5394L	--	--	2.0465	--	--	.7487	--	--	--	--	--
3	--	--	--	--	--	--	--	.7454L	.7331	--	--	--
4	--	--	--	--	.7520	--	--	--	--	--	--	--
5	--	--	3.4411	--	--	--	--	--	--	--	.6467L	--
6	--	1.2988	--	--	--	--	--	.7457	--	--	--	--
7	--	--	--	--	3.7566	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	.6688	--	--
9	2.9658	--	--	1.8965	--	--	2.2266	--	--	--	--	--
10	--	--	--	--	--	--	--	--	1.4859	--	--	.6384
11	--	--	--	--	--	.7584	2.2442	--	--	--	--	--
12	--	--	5.4954	--	--	--	--	--	--	--	.6483L	--
13	--	1.9494	--	--	--	--	--	1.5034	1.4549	--	--	--
14	--	--	--	--	1.5144	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	1.3139	--	--
16	3.6748	--	--	1.4289	--	--	1.5291	--	--	--	--	--
17	--	--	--	--	--	--	--	--	.7271	--	--	.6465
18	--	--	--	--	--	3.0181	--	--	--	.6509L	--	--
19	--	--	2.7369	--	--	--	--	--	--	--	.6498	--
20	--	3.9716	--	--	--	--	--	1.4893	--	--	--	--
21	--	--	--	--	1.5170	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	1.2991	--	--
23	--	--	--	1.4945	--	--	1.4685	--	--	--	--	--
24	--	--	--	--	2.2791	--	--	--	1.3859	--	--	1.1759
25	--	--	--	--	--	1.5060	--	--	--	--	--	--
26	--	--	.7003	--	--	--	--	--	--	--	.6429	--
27	--	--	--	1.4953	--	--	--	--	--	--	--	--
28	--	--	--	--	.7594L	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	.6492L	--	--
30	3.1859	--	--	2.9969	--	--	.7494	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	.5389
MEAN	2.5913	2.4066	3.0934	1.8918	1.7631	1.7608	1.4944	1.1209	1.1574	.8738	.6469	.7499
MAX	3.6748	3.9716	5.4954	2.9969	3.7566	3.0181	2.2442	1.5034	1.4859	1.3139	.6498	1.1759
MIN	.5394	1.2988	.7003	1.4289	.7520	.7584	.7487	.7454	.7271	.6492	.6429	.5389
S.D.	1.3996	1.3938	1.9706	.5978	1.1387	1.1512	.6650	.4335	.3917	.3353	.0030	.2862
VAR	1.9588	1.9428	3.9158	.3564	1.2785	1.3253	.4423	.1879	.1535	.1124	.0000	.0838

55	NOBS				
1.586146	ARITHMETIC MEAN	1.420902	MEDIAN	4.956546	RANGE
1.180187	VARIANCE	1.299154	GEOMETRIC MEAN	1.093169	HARMONIC MEAN
		1.086327	STANDARD DEVIATION	.684885	COEFFICIENT OF VARIATION

TABLE D.2

STATION NUMBER - 08ON02MA0030000
REGION - ONTARIO
LOCATION - LAT. 044/11/60 LONG. 076/13/59

AVERAGE DEPTH(M) -
WATER TYPE - SURFACE (STREAM-CHANNEL)

NARRATIVE : ST LAWRENCE RIVER (SOUTH CHANNEL) AUTOMATIC DAILY SAMPLER LOCATED ON WOLFE ISLAND BETWEEN BANFORD PT AND US SHORE (RANGE 179-S)(122M-400FT FROMCANADIAN SHORE)

PARAMETER CODE 13382P. ALUMINUM
13305P. EXTRBLE.
AL
MG/L

DAILY LOADINGS IN METRIC TONS/DAY

1984 DAY	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1	--	--	--	--	--	--	--	--	--	3.97	--	--
2	16.72	--	--	11.60	--	--	11.23	--	--	--	--	--
3	--	--	--	--	--	--	--	.75L	6.60	--	--	--
4	--	--	--	--	5.26	--	--	--	--	--	--	--
5	--	--	--	--	--	--	--	--	--	--	7.76	--
6	--	3.98	--	--	--	--	--	4.47	--	--	--	--
7	--	--	--	--	21.79	--	--	--	--	--	--	--
8	--	--	--	--	--	--	--	--	--	4.68	--	--
9	14.83	--	--	15.80	--	--	3.71	--	--	--	--	--
10	--	--	--	--	--	--	--	--	5.20	--	--	21.87
11	--	--	--	--	--	10.62	4.49	--	--	--	--	--
12	--	--	17.17	--	--	--	--	--	--	--	5.83	--
13	--	3.98	--	--	--	--	--	5.26	8.80	--	--	--
14	--	--	--	--	20.44	--	--	--	--	--	--	--
15	--	--	--	--	--	--	--	--	--	3.94	--	--
16	15.31	--	--	17.76	--	--	2.29	--	--	--	--	--
17	--	--	--	--	--	--	--	--	2.91	--	--	22.63
18	--	--	--	--	--	8.38	--	--	--	2.68	--	--
19	--	--	7.53	--	--	--	--	--	--	--	7.25	--
20	--	7.94	--	--	--	--	--	5.21	--	--	--	--
21	--	--	--	--	22.76	--	--	--	--	--	--	--
22	--	--	--	--	--	--	--	--	--	4.55	--	--
23	24.85	--	--	23.17	--	--	8.81	--	--	--	--	--
24	--	--	--	--	14.43	--	--	--	6.24	--	--	12.93
25	--	--	--	--	--	3.01	--	--	--	--	--	--
26	--	--	8.48	--	--	--	--	--	--	--	6.43	--
27	--	--	--	8.22	--	--	--	--	--	--	--	--
28	--	--	--	--	18.63	--	--	--	--	--	--	--
29	--	--	--	--	--	--	--	--	--	4.54	--	--
30	16.57	--	--	29.22	--	--	3.88	--	--	--	--	--
31	--	--	--	--	--	--	--	--	--	--	--	12.93
MEAN	17.65	5.25	11.03	17.63	15.89	7.31	5.59	3.92	5.79	4.85	6.79	17.39
MAX	24.85	7.94	17.17	29.22	22.76	10.62	11.23	5.26	8.80	4.68	7.76	22.63
MIN	14.83	3.98	7.53	8.22	5.26	3.01	2.29	.75	2.91	2.68	5.83	12.93
S.D.	4.18	2.34	5.33	7.66	7.01	3.61	3.59	2.15	1.90	.77	.84	2.19
VAR	16.82	5.46	28.46	58.64	49.07	15.28	12.90	4.62	3.60	.68	.78	26.89

55	NOBS	7.943292	MEDIAN	28.474782	RANGE
10.169566	ARITHMETIC MEAN	7.921588	GEOMETRIC MEAN	5.816688	HARMONIC MEAN
49.856543	VARIANCE	7.084180	STANDARD DEVIATION	.688739	COEFFICIENT OF VARIATION

TABLE D.3